

**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of: Francis Y. Tsang et al.

Examiner: Ricardo J. Palabrica

Serial No.: 10/720,035

Group Art Unit: 3663

Filed: November 21, 2003

Docket: 2408.001US1

For: NUCLEAR VOLTAIC CELL

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**APPEAL BRIEF UNDER 37 CFR § 41.37**

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Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

The Appeal Brief is presented in support of the Notice of Appeal to the Board of Patent Appeals and Interferences, filed on September 11, 2008, from the Final Rejection of claims 23-25, 27-29, and 79-82 of the above-identified application, as set forth in the Final Office Action mailed on May 12, 2008.

The Commissioner of Patents and Trademarks is hereby authorized to charge Deposit Account No. 19-0743 in the amount of \$540.00 which represents the requisite fee set forth in 37 C.F.R. § 41.20(b)(2). The Appellants respectfully request consideration and reversal of the Examiner's rejections of pending claims.

**APPEAL BRIEF UNDER 37 C.F.R. § 41.37**

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## **1. REAL PARTY IN INTEREST**

The real party in interest of the above-captioned patent application is the assignee,  
GLOBAL TECHNOLOGIES, INC.

## **2. RELATED APPEALS AND INTERFERENCES**

Application serial number 11/240,280 (Docket: 2408.001US4) is concurrently appealed and may have bearing on the Board's decision in the present appeal. The fundamental issues presented in that appeal are similar to the issues presented in this appeal, though the rejections in that appeal are slightly different from those presented here.

### **3. STATUS OF THE CLAIMS**

The present application was filed on November 21, 2003 with claims 1-78. On July 11, 2005 claims 1-78 were subjected to a Restriction Requirement, requiring election between both inventions and species within each identified invention. In the Response to Restriction Requirement filed August 8, 2005, the invention of claims 1-29 was elected without traverse and claims 30-78 were withdrawn from consideration and without prejudice; and the species election further withdrew from consideration claim 1-21 and 26 .

A non-final Office Action mailed November 22, 2005 addressed the remaining claims 23-25 and 27-29. An Amendment in Response to the Office Action was filed March 22, 2006 and claims 23, 24, and 27-29 were amended. A Final Office Action was mailed July 14, 2006 addressing claims 23-25, and 27-29. A Request for Continued Examination was filed December 14, 2006, in which claim 28 was amended. A non-final Office Action was mailed April 6, 2007 addressing claims 23-25, and 27-29. In the Amendment and Response filed on June 22, 2007 claim 79 was added and claim 23 was amended. A Final Office Action was mailed on July 31, 2007 addressing claims 23-25, 27-29, and 79. An Amendment and Response was filed on August 22, 2007 in which claim 23 was amended. An Advisory Action was mailed on August 31, 2007.

A subsequent Request for Continued Examination was filed on October 11, 2007, and claims 23 and 29 were amended and claims 80-82 were added in an accompanying Preliminary Amendment. A non-final Office Action was mailed on November 27, 2007 rejecting claims 23-25, 27-29, and 79-82. An Amendment and Response was filed March 27, 2008. A Final Office Action was mailed May 12, 2008 in which claims 23-25, 27-29, and 79-82 were rejected. Therefore, claims 23-25, 27-29, and 79-82 stand at least twice rejected, remain pending, and are the subject of the present Appeal.

#### **4. STATUS OF AMENDMENTS**

No Amendments have been made subsequent to the Final Office Action dated May 12, 2008.

## **5. SUMMARY OF CLAIMED SUBJECT MATTER**

Aspects of the presently claimed subject matter include, but are not limited to, a nuclear voltaic cell. References to the specification in the following discussion of each claim are in reference to the re-formatted specification as filed April 23, 2004, and as further amended on March 22, 2006. The references to Figure 4 herein are to amended Figure 4, as submitted March 22, 2006, and as accepted in the Office Action of April 27, 2007.

The claims are believed to be readily understandable in their current form, and thus have been used directly as the basis for the summary of the subject matter claimed.

### **INDEPENDENT CLAIM 23**

A nuclear voltaic cell configured to generate an electrical current, [e.g., p. 12, lines 25-29; FIGs. 1 and 4 at 5] comprising:

- a first metal contact layer having a first side; [e.g., p. 13, lines 1-21; p. 16, lines 28-31 through p. 17, line 1; FIGs. 1 and 4 at 30]

- a second metal contact layer having a first side, [e.g., p. 13, lines 1-21; p. 16, lines 28-31 through p. 17, line 1; FIGs. 1 and 4 at 10]

- wherein said first side of said second metal contact layer is positioned facing said first side of said first metal contact layer and forms a channel between said first and second metal contact layers; [e.g., p. 13, lines 1-21; FIGs. 1 and 4 at channel between 30 and 10]

- a liquid semiconductor located within said channel and in contact with said first side of said first metal contact layer and in contact with said first side of said second metal contact layer, [e.g., p. 13, lines 1-21; p. 16, lines 28-31 through p. 17, lines 1-4; FIGs. 1 and 4 at 20]

- wherein said liquid semiconductor contains a radioactive isotope in solution [e.g., p. 16, lines 12-29, FIG. 4] and said first side of said first metal contact layer forms a Schottky contact with said liquid semiconductor, [e.g. p. 16, lines 28-31 continued at p. 17, lines 1-7; FIG. 4] and said first side of said second

metal contact layer forms a low resistance or ohmic contact with said liquid semiconductor, [e.g., p. 16, lines 28-31 continued at p. 17, lines 1-7; FIG. 4]  
and wherein said liquid semiconductor comprises at least one chalcogen, said chalcogen selected from the group consisting essentially of sulfur, selenium and tellurium; [e.g., p. 14, lines 4-6; FIGs. 1 and 4 at 20] and  
an electrical circuit connecting said first metal contact layer to said second metal contact layer. [e.g., p. 13, line 19-21; FIGs. 1 and 4 at 35]

#### **DEPENDENT CLAIM 24**

A nuclear voltaic cell according to claim 23 further comprising: an electrical load connected to said electrical circuit, wherein electrical power is generated when said electrical load is connected to said electrical circuit. [e.g., p. 13, lines 19-21; FIGs. 1 and 4 at 35]

#### **DEPENDENT CLAIM 25**

A nuclear voltaic cell according to claim 23, wherein said liquid semiconductor is a p-type semiconductor. [e.g., p. 8, lines 7-9]

#### **DEPENDENT CLAIM 26**

A nuclear voltaic cell according to claim 23, wherein said liquid semiconductor is an n-type semiconductor. [e.g., p. 8, lines 7-9]

#### **DEPENDENT CLAIM 27**

A nuclear voltaic cell according to claim 23, further comprising: a plurality of nonconductive spacers abutted between said first side of said first metal contact layer and said first side of said second metal contact layer to maintain said channel between said first and second metal contact layers, wherein with said liquid semiconductor within said channel surrounds said plurality of nonconductive spacers. [e.g., p. 16, lines 28-31 continued at p. 17, lines 1-7; FIG. 4 at 45]



**DEPENDENT CLAIM 28**

A nuclear voltaic cell according to claim 23, wherein said liquid semiconductor flows through said channel between said first metal contact layer and said second metal contact layer. [e.g., p. 13, lines 1-11; FIG. 1]

**DEPENDENT CLAIM 29**

A nuclear voltaic cell according to claim 23, further comprising: a mandrel, wherein said first metal contact layer and said second metal contact layer with said channel therebetween are wound around said mandrel to form the cell. [e.g., p. 17, lines 14-23; FIG. 7 at 200]

**DEPENDENT CLAIM 79**

A nuclear voltaic cell according to claim 23, further comprising at least one nonconductive spacer situated between said first side of said first metal contact layer and said first side of said second metal contact layer to maintain said channel between said first and second metal contact layers. [e.g., p. 16, lines 28-31 continued at p. 17, lines 1-7; FIG. 4 at 45]

**DEPENDENT CLAIM 80**

A nuclear voltaic cell according to claim 23, wherein said liquid semiconductor comprises selenium. [e.g., p. 14, lines 3-4]

**DEPENDENT CLAIM 81**

A nuclear voltaic cell according to claim 23, wherein said liquid semiconductor is a mixture comprising said chalcogen. [e.g., p. 14, lines 6-9]

**DEPENDENT CLAIM 82**

A nuclear voltaic cell according to claim 23, wherein said liquid semiconductor is an alloy comprising said at least one chalcogen and a metal. [e.g., p. 14, lines 6-9]

This summary does not provide an exhaustive or exclusive view of the present subject matter, and Appellant refers to each of the appended claims and its legal equivalents for a complete statement of the invention.

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## **6. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

Claims 23-25, 27-29, and 79-82 were rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement.

Claims 23-25, 27-29, and 79-82 were rejected under 35 U.S.C. § 112, first paragraph, as based on a disclosure which is not enabling.

Claims 23-25, 27-29, and 79-82 were rejected under 35 U.S.C. § 112, second paragraph, as for omitting critical or essential elements (citing MPEP § 2172.01).<sup>1</sup>

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<sup>1</sup> Applicants note that the section is specific that the omission rejection under the section, if it were appropriate, should be under § 112, first paragraph, rather than second paragraph.

## **7. ARGUMENT**

Claims 23-25, 27-29, and 79-82 were rejected on three different bases under § 112 – two asserted bases under § 112, first paragraph, and one under § 112, second paragraph. Applicants will address the first basis for rejection alone, and the second and third bases together.

As a preliminary note, reference to the “Office Action” within, refers to the non-final Office Action dated November 27, 2007. Although all arguments of this Office Action have been reasserted in the last received, Final Office Action dated May 12, 2008, all addressable substantive arguments are within the previous non-final Office Action of November 27, 2007.

Additionally, the Final Office Action of May 12, 2008 provides two additional assertions in support of the first rejection under § 112, first paragraph, of non-enablement: 1) the invention as disclosed would require undue experimentation because of Applicant’s alleged failure to provide operational parameters, and 2) the utility disclosed in the specification is not congruent with the claimed invention.<sup>2</sup> Both supporting assertions will be addressed with the first rejection under § 112 first paragraph.

### **A. The First Rejection Under 35 U.S.C. § 112, First Paragraph**

All claims, 23-25, 27-29, and 79-82 were rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement,<sup>3</sup> specifically for failing to disclose:

- (a) “the minimum voltage and current to form a working nuclear voltaic cell (e.g. to generate a 1000 megawatt power);

<sup>2</sup> See Final Office Action dated May 12, 2008 at pages 3-5 rejecting claims on an alleged lack of utility under 35 U.S.C. § 101. Additionally, the Final Office Action asserts “failure to provide these [operational] parameters is evidence of undue experimentation to exercise the claimed invention.” at page 5, paragraph 2.

<sup>3</sup> The statement of the rejection at paragraph 2 of the non-final Office Action dated November 27, 2007 (arguments reasserted in Final Office Action dated May 12, 2008 at paragraph 4, page 6) states the basis as “failing to comply with the enablement requirement;” but the statement proximate the six asserted deficiencies of the specification recites that there “is neither an adequate description nor an enabling disclosure” as to the identified six questions. See non-final Office Action dated November 27, 2007, paragraph 2, page 3 and page 4. Applicants assume that the only intended rejection is that on enablement and that the additional mention of the description requirement was unintended. However, Applicants submit that the reasons set forth herein establishing the impropriety of the enablement rejection are also equally pertinent to establishing the impropriety of the description rejection if such was intended.

- (b) what level of purity is required for the liquid semiconductor (i.e. prior to introduction of chalcogen material);
- (c) what are the temperature, flow and pressure levels of the system;
- (d) what should be the volumetric or weight ratio of chalcogen to the liquid semiconductor;
- (e) how and in what manner is it assured that nuclear decay products are sufficiently removed by a scrubber from the liquid semiconductor to minimize radiation damage (note that the ability to "self-heal" is an attribute of a liquid semiconductor that applicant alleges as a distinct advantage over solid semiconductors, and therefore minimizing radiation damage is critical to the invention);
- (f) what is the required minimum enrichment for the chalcogen;<sup>4</sup>

Applicants respectfully submit that the stated basis for rejection is based on an improper extrapolation from Applicants' specification, and upon improper conjecture based on that extrapolation. The Office Action misinterprets selected statements from the specification, taken in isolation, and then extrapolates from those misinterpreted statements to hypothesize that Applicants' invention requires a system with a power output equivalent to that of a nuclear power plant in the range of 1000 megawatts. Based upon that hypothetical power requirement, the Office Action then hypothesizes the above six questions not answered in the specification, resulting in the specification assertedly being non-enabling and the claims assertedly not enabled.

Applicants first address the Office Action's improper premise that Applicants are describing a 1,000 megawatt nuclear voltaic cell, as this is a recurring and pivotal assertion in the rejections under § 112. In support of this premise, the Office Action quotes numerous isolated passages from Applicant's specification.<sup>5</sup> In the interests of brevity, not all of those quoted passages will be repeated here. Even in all those quoted passages, however, the only specific

<sup>4</sup> See Final Office Action dated May 12, 2008 at paragraph 4, page 6 reasserting arguments from non-final Office Action dated November 27, 2007 at paragraph 2, pages 3-5.

<sup>5</sup> See non-final Office Action dated November 27, 2007 at pages 3-4.

power output identified by the Applicant is “power up to and exceeding the megawatt range.”<sup>6</sup> But even that statement quoted in the Office Action cannot be used to support an allegation that the claimed inventive nuclear voltaic cell is to have a capacity of even 1 megawatt. As stated by Applicants, (and including the second sentence omitted in the quote in the Office Action):

The present invention is very adaptable because multiple nuclear voltaic cells -- comprising any of the embodiments described above, i.e., embodiments 1, 2, 3, or 4--may be linked together to form a critical array, described as embodiment 5 above, to provide power up to and exceeding the megawatt range.  
For small power needs a single or small number of cells may be used.

The invention claimed here is a single nuclear voltaic cell-- not a combination of nuclear voltaic cells as depicted in Fig. 9-- not a nuclear voltaic cell reactor, as depicted in Fig. 10-- not a nuclear voltaic cell reactor including a coolant loop and scrubber loop as depicted in Fig. 11. Just a single nuclear voltaic cell.

In being directed to a single nuclear voltaic cell, Applicants' claims correspond to the subject matter depicted in Figs. 1 and 4 of the specification. At the level of individual cells, the cells have the capacity to be relatively compact. As depicted in Fig. 1, a portion of the stacked structure in the depicted example embodiment is shown with a dimension of  $1.63 \times 10^{-2}$  cm. Thus, to any person skilled in the art, the described nuclear voltaic cell-- the device addressed in claims 23-25, 27-29, and 79-82-- is manifestly not one intended to power a “large transport vehicle” such as a submarine or ship; or to have an output in the range of 1,000 megawatts, as asserted in the Office Action. Such a power output from such a small cell would be quite remarkable; and certainly not expected by those skilled in the art.

Applicants are aware that the Examiner has substantial background in the nuclear arts; and if the Examiner had not been so express about the allegation of a 1,000 megawatt nuclear voltaic cell,<sup>7</sup> Applicants would have had to assume that some different allegation was intended. However, given the express assertion, Applicants must respectfully submit that the conjecture as

<sup>6</sup> See non-final Office Action dated November 27, 2007 at page 3.

<sup>7</sup> See non-final Office Action dated May 12, 2008, page 4, last paragraph, item “(a).”

to the claimed cell is manifestly inconsistent with what would be understood by a person skilled in the art; and that the further extrapolation based upon that conjecture is simply inappropriate.

Additionally, the above-quoted passage of Applicants' specification discusses the linking of multiple cells together "to form a critical array . . . to provide power up to and exceeding the megawatt range."<sup>8</sup> Thus, even there, the specification speaks only of a power capacity exceeding a megawatt. For the Office Action to attempt to multiply that 1,000-fold, and convert Applicants' specification into one requiring enablement of a 1,000 megawatt power source, and to then interpret the specification as inadequate because it does not address questions which the Examiner conceives of relative to that hypothesized 1,000 megawatt power source—from a single cell (as claimed) — is inappropriate.

The Federal Circuit has instructed that the specification is presumed to be enabling:

A specification disclosure which contains a teaching of the manner and process of making and using the invention in terms which correspond in scope to those used in describing and defining the subject matter sought to be patented *must* be taken as in compliance with the enabling requirement of the first paragraph of § 112 *unless* there is reason to doubt the objective truth of the statements contained therein which must be relied upon for enabling support... [a]ny party making the assertion that a US patent specification or claims fails for one reason or another to comply with § 112 bears the burden of persuasion in showing said lack of compliance.<sup>9</sup>

Thus, there is a clear presumption that a submitted specification is enabling, and the burden of persuasion is on a party seeking to establish non-enablement.

Importantly, precedent is clear that an applicant's burden to disclose only goes to that subject matter which is new. That subject matter which is conventional knowledge to those skilled in the art will be read into the disclosure:

It is well settled that the disclosure of an application embraces not only what is specifically set forth in words or drawings, but what would be understood by persons skilled in the art. As was said in *Webster Loom Co. v. Higgins et al.*, 105 U.S. 580, 586 the applicant "may begin at the point where his invention begins, and describe what he has made that is new and where it replaces of the old. That

<sup>8</sup> See specification, page 12, lines 2-5.

<sup>9</sup> *Fiers v. Sagano*, *supra*.

which is common and well known is as if it were written out in the patent and delineated in the drawings.<sup>10</sup>

Thus, subject matter which would be known to those skilled in the relevant arts is not required to be disclosed for the invention to be enabled.

Further, as is well known, the standard on enablement under § 112 is that the claimed invention be sufficiently enabled that persons skilled in the art can make and use the invention without undue experimentation.<sup>11</sup> Thus, the stated test expressly contemplates that some selection and/or experimentation may be required. The fact that experimentation may be complex does not necessarily make it undue if the art typically engages in such experimentation.<sup>12</sup> It is also significant that when evaluating the question of enablement which may involve different scientific disciplines, that the specification is enabling if it enables those skilled in the art to carry out the different aspects of the inventions applicable to their specialty.<sup>13</sup>

Applicants respectfully submit that if the 6 questions raised in the Office Action were to be answered, they could only be answered by a specification that was, in fact, a blueprint for a specific nuclear voltaic cell—if even then. Some of the questions are so specific they could only be answered in response to a specific and fully engineered configuration. As but one example, as persons skilled in the art will recognize, the required level of purity for the liquid semiconductor is almost certainly, to at least some degree, subject to trade offs to other concerns (technical or commercial), and thus there is likely no single “correct” answer of the required level of purity, even as to a specific system configuration. At a bare minimum, the level of detail suggested by the Office Action to be required for enablement if each of the above 6 questions were in fact required to be answered, would be far in excess of that disclosed in the vast majority of U.S.

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<sup>10</sup> See *In re Howarth*, 210 USPQ 2d 689, 691 (CCPA 1981).

<sup>11</sup> See *In re Wands* 8 USPQ 2d 1400, 1404 (Fed. Cir 1998); see also *United States v. Teletronics, Inc.*, 8 USPQ 2d 1217, 1223 (Fed Cir 1988); (both as cited in MPEP § 2164.01).

<sup>12</sup> See MPEP § 2164.01, referencing *In re Certain Limited-Charge Cell Culture Microcarriers*, 221 USPQ 1174 (Int'l Trade Comm'n 1983), as cited therein.

<sup>13</sup> See MPEP § 2164.05(b), citing *In re Naquin*, 158 USPQ 317, 319 (CCPA 1968).



applications and issued patents; and even further in excess of what is actually required by § 112.<sup>14</sup>

The requirement of providing information at a level of detail that would constitute a blueprint of the invention is clearly in excess of the obligation under 35 U.S.C. § 112, first paragraph. Accordingly, Applicants respectfully submit that the positions stated in this rejection fail to establish even a *prima facie* case of non-enablement in accordance with MPEP § 2104.04, because it does meet the requirement of providing the required “reasonable basis” as to why the disclosure does not adequately teach the manner and process of making and using the invention.<sup>15</sup> Further, there is no substantive evidence or reasoning provided for why the answers to the 6 questions are assertedly necessary to have an enabling specification; and in the absence of such, there is no need for the Applicants to go to the trouble and expense of supporting the presumptively accurate disclosure.<sup>16</sup>

Additionally, Applicants respectfully submit that the detailed intricacies of the invention addressed by the above identified questions would be within the level of skill of those familiar and experienced in the design of nuclear power sources. As stated previously, specific answers to the questions will be dependent upon the precise configurations and materials selected for use. The persons having the ability to design a nuclear cell or battery will have the ability, in the course of such activity, to determine the answers to the above questions without undue experimentation. It seems apparent to those with an understanding of engineering that the design of nuclear power sources presents, under any circumstances, sophisticated engineering questions to be addressed. Applicants therefore feel that these points are sufficiently self-evident that no extrinsic evidence should be required to establish either the absence of a *prima facie* case of non-enablement, or the sufficiency of Applicants' specification under § 112. Accordingly, Applicants

<sup>14</sup> See *Staehtlin v. Secher*, 24 USPQ2d 1513, 1516 (B.P.A.I. 1992), (citing *In re Marzocchi*, 439 F.2d 220, 169 USPQ 367 (CCPA 1971) and *In re Gay*, 309 F.2d 769, 135 USPQ 311 (CCPA 1962), “the law does not require a specification to be a blueprint in order to satisfy the requirement for enablement under 35 USC 112, first paragraph.”). See also MPEP § 608.01(h) a patent specification is not intended nor required to be a production specification.

<sup>15</sup> *Stachelin v. Secher*, 24 USPQ 1513, 1516 (B.P.A.I. 1992) (“The law does not require a specification to be a blueprint in order to satisfy the requirement for enablement under 35 U.S.C. § 112, first paragraph.”)

<sup>16</sup> See MPEP § 2164.04; *In re Marzocchi*, 439 F2d 220, 224 (CCPA 1971).

respectfully request the reconsideration and withdrawal of the rejections of claims 23-25, 27-29, and 79-82 under 35 U.S.C. § 112, first paragraph.

The Final Office Action dated May 12, 2008, supports the rejection of all claims under § 112, first paragraph, stating “failure to provide these [operation] parameters is evidence of undue experimentation to exercise the claimed invention.”<sup>17</sup> Applicants respectfully submit the disclosure satisfies the enablement requirement under § 112, first paragraph and the disclosure does not require undue experimentation to practice the claimed invention.

The MPEP is clear as to the factors to be considered when determining whether there is sufficient evidence to whether any experimentation is “undue” and therefore the disclosure does not satisfy the enablement requirement.<sup>18</sup> Section 2164.01(a) identifies, in a “non-exhaustive list,” eight factors to be considered when determining whether sufficient evidence exists to support a determination that a disclosure does not satisfy the enablement requirement, and whether any necessary experimentation is undue. As stated in this section of the MPEP, these factors include, but are not limited to:

- (a) the breadth of the claims
- (b) the nature of the invention
- (c) the state of the prior art
- (d) the level of one of ordinary skill
- (e) the level of predictability in the art
- (f) the amount of direction provided by the inventor
- (g) the existence of working examples; and
- (h) the quantity of experimentation needed to make or use the invention based on the content of the disclosure.<sup>19</sup>

A determination of non-enablement cannot be solely based on any one of the above factor alone while ignoring the other factors; any conclusion of non-enablement must be based on the evidence as a whole. “The determination that ‘undue experimentation’ would have been needed to make and use the claimed invention is not a single, simple factual determination. Rather, it is a

<sup>17</sup> See Final Office Action dated May 12, 2008, page 5, first full paragraph.

<sup>18</sup> See MPEP § 2164.01(a) Undue Experimentation Factors.

<sup>19</sup> See also *In re Wands*, 8 USPQ 2d 1400, 1404 (Fed Cir 1988).

conclusion reached by weighing all the above noted factual considerations.”<sup>20</sup> “A conclusion of lack of enablement means that, based on the evidence regarding each of the above factors, the specification, at the time the application was filed, would not have taught one skilled in the art how to make and/or use the full scope of the claimed invention without undue experimentation.”<sup>21</sup>

The Final Office Action boldly asserts that there is evidence of undue experimentation because Applicants’ specification did not provide the six parameters enumerated above, and also because the specification did not disclose how many cells would be required to produce a particular power level.<sup>22</sup> The alleged necessity of the first six factors has been adequately addressed above, and in the interest of brevity, will not be readdressed here. The additional parameter of number of cells for a particular output is similarly analyzed as the other six parameters. However, it must be repeated here that the question is irrelevant to claims at issue, drawn to a single nuclear voltaic cell.

However, to address the point raised by the Examiner, notwithstanding the lack of pertinence to the claims at hand, the number of cells required to produce a particular power output is only answerable by a blueprint for a linked array of nuclear voltaic cells, detail far in excess of a disclosure required to enable the invention under § 112, first paragraph. Furthermore, such a requirement of the claimed invention to provide a specific number of cells to create a specific power level would detract from the understood variable and adaptive nature of its application to a variety of power levels as has been clearly disclosed in the specification.<sup>23</sup> Applicant submits that the specification is enabling and any experimentation would not be undue to practice the invention even without having disclosed a specific number of cells for a particular output.

<sup>20</sup> See MPEP § 2164.01(a) citing *In re Wands*, 858 F.2d at 737, 8 USPQ2d at 1404.

<sup>21</sup> See MPEP § 2164.01(a) citing *In re Wright*, 999 F.2d 1557, 1562, 27 USPQ2d 1510, 1513 (Fed. Cir. 1993).

<sup>22</sup> See Final Office Action dated May 12, 2008 at page 5, first 3 paragraphs.

<sup>23</sup> See specification at page 14, lines 13-16.

Regarding the supporting argument in the Final Office Action for the alleged lack of utility under MPEP § 2107.02, II. A.,<sup>24</sup> MPEP § 2107 establishes the guidelines for the examination of applications for compliance with the utility requirements of 35 U.S.C. §§ 101 and 112. At (II) (A) it is stated:

(A) Read the claims and the supporting written description.

(1) Determine what the applicant has claimed, noting any specific embodiments of the invention.

(2) Ensure that the claims define statutory subject matter (i.e., a process, machine, manufacture, composition of matter, or improvement thereof).

(3) If at any time during the examination, it becomes readily apparent that the claimed invention has a well-established utility, do not impose a rejection based on lack of utility. An invention has a well-established utility if (i) a person of ordinary skill in the art would immediately appreciate why the invention is useful based on the characteristics of the invention (e.g., properties or applications of a product or process), and (ii) the utility is specific, substantial, and credible.

As is evident, the MPEP is clear in the duties required within examination when determining utility. The MPEP further provides that “[i]t is common and sensible for an applicant to identify several specific utilities for an invention, particularly where the invention is a product (e.g., a machine, an article of manufacture or a composition of matter).”<sup>25</sup> Thus, if applicant makes one credible assertion of utility, utility for the claimed invention as a whole is established.<sup>26</sup> “Regardless of the form of statement of utility, it must enable one ordinarily skilled in the art to understand why the applicant believes the claimed invention is useful.”<sup>27</sup> “As the Court of Customs and Patent Appeals stated in *In re Langer*:

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<sup>24</sup> See Final Office Action dated May 12, 2008 at page 3.

<sup>25</sup> See MPEP § 2107.02, I. (citing the following: See, e.g., *Raytheon v. Roper*, 724 F.2d 951, 958, 220 USPQ 592, 598 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 835 (1984); *In re Gottlieb*, 328 F.2d 1016, 1019, 140 USPQ 665, 668 (CCPA 1964) *In re Malachowski*, 530 F.2d 1402, 189 USPQ 432 (CCPA 1976); *Hoffman v. Klaus*, 9 USPQ2d 1657 (Bd. Pat. App. & Inter. 1988)).

<sup>26</sup> MPEP § 2107.02, I.

<sup>27</sup> MPEP § 2107.02, II. A.

As a matter of Patent Office practice, a specification which contains a disclosure of utility which corresponds in scope to the subject matter sought to be patented must be taken as sufficient to satisfy the utility requirement of § 101 for the entire claimed subject matter unless there is a reason for one skilled in the art to question the objective truth of the statement of utility or its scope.”<sup>28</sup>

And thus the MPEP directs that “. . . *Langer* and subsequent cases direct the Office to presume that a statement of utility made by an applicant is true.”<sup>29</sup>

Applicants respectfully submit the claimed invention has a readily apparent well-established utility and a person of ordinary skill in the art would immediately appreciate why the invention is useful based on the characteristics of the invention. Furthermore, the utility is specific, substantial, and credible. Therefore, the rejection of claims 23-25, 27-29, and 79-82 under 35 U.S.C. § 112, first paragraph cannot adequately be supported by an alleged deficiency under 35 U.S.C. § 101.

Applicants submit the stated basis for supporting the maintenance of the § 112, first paragraph rejection is improper because the Final Office Action once again extracts and isolates statements from the specification and misinterprets these statements to assert the alleged utility is “to generate large amounts of electrical energy and NOT to generate current from a single nuclear voltaic cell” and further improperly asserts generating large amounts of energy as being the “only disclosed utility for the invention”.<sup>30</sup> From this limited appreciation and viewpoint of the invention, the Final Office Action declares, given the small size of the nuclear voltaic cell, no enablement has been shown for the alleged utility.<sup>31</sup>

As noted above, the MPEP clearly states that a specification may have more than one established utility, and furthermore, that utility is determinable by the standard of a person having ordinary skill in the art. The parsed sentence extracted from the specification begins with the phrase “Another object of the present invention” and is fully quoted below:

<sup>28</sup> MPEP § 2107.02, III. A. (citing *In re Langer*, 503 F.2d at 1391, 183 USPQ at 297 (emphasis in original)).

<sup>29</sup> MPEP § 2107.02, III. A. (citing *In re Langer*, 503 F.2d at 1391, 183 USPQ at 297; *In re Malachowski*, 530 F.2d 1402, 1404, 189 USPQ 432, 435 (CCPA 1976); *In re Brana*, 51 F.3d 1560, 34 USPQ2d 1436 (Fed. Cir. 1995)).

<sup>30</sup> See Final Office Action, dated May 12, 2008, page 3 at first and second full paragraph (emphasis in original).

<sup>31</sup> See Final Office Action, dated May 12, 2008, page 3, first full paragraph through page 4, first full paragraph.

Another object of the present invention is to provide a method and apparatus that meets the long felt need for a method of converting nuclear energy to electrical energy that is small in size, reliable and can generate large amounts of electrical energy for use in submarines, surface ships, and as a battery to power a whole range of products – including, for example, military equipment, satellites and space vehicles.<sup>32</sup>

This is a clear indication the invention has more than one stated utility. However, the Final Office Action chooses to select a utility convenient to the asserted argument and neglects to acknowledge or consider other stated exemplary utilities clearly described within, one such example below:

The present invention is very adaptable because multiple nuclear voltaic cells may be linked together in an array to form a nuclear voltaic battery, described in embodiment 10 above, to provide ranges from a fraction of a watt to greater than Megawatts. For smaller power needs a single or small number of cells may be used.<sup>33</sup>

Under the rule in *In re Langer*, as adopted by the Federal Circuit, the excerpt from the specification which contains a disclosure of utility that corresponds in scope to the subject matter sought to be patented must be taken as sufficient to satisfy the utility requirement of § 101 for the entire claimed subject matter unless there is a reason for one skilled in the art to question the objective truth of the statement of utility or its scope. To bring this objective truth into question, the MPEP at § 2164.07(1) (B) clearly places the burden on the Examiner and requires a reasonable basis to support the conclusion that the invention lacks utility. Because the Final Office Action misinterprets and limits the scope of the disclosed utility and because the entire rejection is based on that misinterpreted, limited scope, Applicants respectfully submit this burden has not been met. Furthermore, the exemplary statement above shows at least one specific, substantial, and credible utility sufficient to satisfy the utility requirement under § 101. Therefore, Applicants respectfully submit the argument supporting the rejection of the claims

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<sup>32</sup> See specification, page 7, line 23 continued on page 8, lines 1-4 (emphasis added).

<sup>33</sup> See specification, page 14, lines 13-16 (emphasis added).

under 35 U.S.C. § 112 for lack of utility under 35 U.S.C. § 101 is inappropriate and should be withdrawn.

Accordingly, for all the reasons set forth above, Applicants respectfully submit that each of the rejections under 35 USC § 112 is inappropriate and should be withdrawn; and Applicants respectfully request such withdrawal.

**B. Second and Third Rejections Under 35 U.S.C. § 112, First and Second Paragraphs**

The second and third rejections under § 112 are related to one another. All claims, 23-25, 27-29, and 79-82 were again rejected under 35 U.S.C. § 112, first paragraph, as based on a disclosure of which is non-enabling because the "scrubbing the liquid semiconductor of nuclear decay products is critical or essential to the practice of the invention, but not included in the claim(s) [sic] is not enabled by the disclosure."<sup>34</sup> Similarly, all claims were rejected under 35 USC § 112, second paragraph, as being incomplete for omitting allegedly essential elements: "means for that scrubbing and purifying the liquid semiconductor."

The assertion in the Office Action is that Applicants allegedly admitted the criticality of scrubbing and purifying the liquid semiconductor, citing a sentence from paragraph 0014 of the specification. Paragraph 0014 (including the cited sentence), does not discuss at all liquid semiconductors, but describes problems with prior art solid semiconductors. Moreover, the passage does not discuss scrubbing or purifying the semiconductor. Instead the cited paragraph describes a disadvantage of prior art solid semiconductors--that over time trace amounts of defects, including native and impurity point defects, significantly reduce semiconductor device performance. Overcoming these problems with solid semiconductors is one advantage of Applicants invention. Thus, in stark contrast to admitting the criticality of scrubbing and purifying the liquid semiconductor -- Applicants identified problems with prior art devices using solid semiconductors that were avoided with Applicants' invention.

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<sup>34</sup> See Final Office Action dated May 12, 2008, paragraph 5, page 7 referencing non-final Office Action dated November 27, 2007 at paragraph 3, pages 5-6.

With respect to the rejection under 35 U.S.C. § 112, second paragraph, the Office Action specifically refers to MPEP § 2172.01.<sup>35</sup> Applicants submit that the referenced section of the MPEP has been misinterpreted. This section starts by making clear that it relates to a situation where the applicant's specification has disclosed subject matter to be essential to the invention but that subject matter is not found that the claims: "[a] claim which omits matter disclosed to be essential to the invention as described in the specification or in other statements of record may be rejected under 35 U.S.C. § 112, first paragraph, as not enabling."<sup>36</sup> As noted above, this is simply not the fact situation presented here. Applicants have not made the supposed admission asserted in the Office Action. Accordingly, there is no basis for the entry of this rejection.

Further, the present rejection seems premised on an interpretation that Applicants are obligated to recite in the claims all components which might be considered necessary for a commercial product. However, that is not what this section of the MPEP indicates, and such an interpretation would be simply incorrect. By analogy, if an applicant's invention was a novel configuration of an automobile powertrain, in the absence of some indication from the applicant in the specification or record that brakes were essential to that invention, the applicant would not be obligated to recite the brakes in the claims, even though brakes would likely be an essential component of a commercially viable product.

Here, some might conjecture (as does the Office Action), that other components including a "means for that scrubbing and purifying the liquid semiconductor" might need to be included in commercially viable systems which incorporate the present invention. But Applicants do not regard such components as integral parts of the inventive subject matter or as subject matter "essential to the invention." Further, Applicants' specification does not indicate, or in any way suggest, that such components are essential to the invention. Accordingly, Applicants respectfully submit that the reliance of the Office Action on MPEP § 2172.01 is misplaced, and that the stated rejection is inappropriate to the facts at hand. Accordingly,

<sup>35</sup> See Final Office Action dated May 12, 2008, paragraph 6, page 7 referencing non-final Office Action dated November 27, 2007 at paragraph 4 at page 6.

<sup>36</sup> MPEP, § 2172.01. Applicants re-note that the section is specific that the rejection under the section, if it were appropriate, should be under § 112, first paragraph, rather than second paragraph, as in the current Office Action.



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Applicants therefore respectfully request the reconsideration and withdrawal of this rejection of claims 23-25, 27-29, and 79-82 under 35 U.S.C. § 112, second paragraph.

## SUMMARY

Applicants respectfully submit that no *prima facie* case of non-enablement has been established for the claimed invention, as is clearly required for a rejection of non-enablement under § 112, first paragraph, to be proper. Additionally, arguments in support of the non-enablement rejection under § 112 for undue experimentation and lack of utility under § 101 presented in the Final Office Action dated May 12, 2008 do not adequately establish or support a conclusion that a *prima facie* case of non-enablement has been established. Furthermore, Applicants further submit that there has not been a *prima facie* showing as to why the asserted "essential elements" should be included in the claims. Moreover, even beyond the absence of the *prima facie* showings, Applicants submit that because the rejections are clearly based on hypotheses that are inconsistent with Applicants' disclosure and the meaning of that disclosure to one of ordinary skill in the art, the rejections are clearly in error. Applicants respectfully request the reversal of all bases of rejection of all pending claims and request an indication that all claims are in condition for allowance.

Respectfully submitted,

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CERTIFICATE UNDER 37 CFR 1.3: The undersigned hereby certifies that this correspondence is being filed using the USPTO's electronic filing system EFS-Web, and is addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 2<sup>nd</sup> day of December 2008.

Name

Kya Sanders

Signature

[Signature]

## **8. CLAIMS APPENDIX**

1-22 (Cancelled)

23. (Previously Presented) A nuclear voltaic cell configured to generate an electrical current, comprising:

a first metal contact layer having a first side;

a second metal contact layer having a first side, wherein said first side of said second metal contact layer is positioned facing said first side of said first metal contact layer and forms a channel between said first and second metal contact layers;

a liquid semiconductor located within said channel and in contact with said first side of said first metal contact layer and in contact with said first side of said second metal contact layer, wherein said liquid semiconductor contains a radioactive isotope in solution and said first side of said first metal contact layer forms a Schottky contact with said liquid semiconductor, and said first side of said second metal contact layer forms a low resistance or ohmic contact with said liquid semiconductor, and wherein said liquid semiconductor comprises at least one chalcogen, said chalcogen selected from the group consisting essentially of sulfur, selenium and tellurium; and

an electrical circuit connecting said first metal contact layer to said second metal contact layer.

24. (Previously Presented) A nuclear voltaic cell according to claim 23 further comprising:

an electrical load connected to said electrical circuit, wherein electrical power is generated when said electrical load is connected to said electrical circuit.

25. (Original) A nuclear voltaic cell according to claim 23, wherein said liquid semiconductor is a p-type semiconductor.

26. (Withdrawn) A nuclear voltaic cell according to claim 23, wherein said liquid semiconductor is an n-type semiconductor.

27. (Previously Presented) A nuclear voltaic cell according to claim 23, further comprising:  
a plurality of nonconductive spacers abutted between said first side of said first metal contact layer and said first side of said second metal contact layer to maintain said channel between said first and second metal contact layers, wherein with said liquid semiconductor within said channel surrounds said plurality of nonconductive spacers.

28. (Previously Presented) A nuclear voltaic cell according to claim 23, wherein said liquid semiconductor flows through said channel between said first metal contact layer and said second metal contact layer.

29. (Previously Presented) A nuclear voltaic cell according to claim 23, further comprising:  
a mandrel, wherein said first metal contact layer and said second metal contact layer with said channel therebetween are wound around said mandrel to form the cell.

30-78 (Cancelled)

79. (Previously Presented) A nuclear voltaic cell according to claim 23, further comprising at least one nonconductive spacer situated between said first side of said first metal contact layer and said first side of said second metal contact layer to maintain said channel between said first and second metal contact layers.

80. (Previously Presented) A nuclear voltaic cell according to claim 23, wherein said liquid semiconductor comprises selenium.

81. (Previously Presented) A nuclear voltaic cell according to claim 23, wherein said liquid semiconductor is a mixture comprising said chalcogen.

82. (Previously Presented) A nuclear voltaic cell according to claim 23, wherein said liquid semiconductor is an alloy comprising said at least one chalcogen and a metal.

## **9. EVIDENCE APPENDIX**

None.

**10. RELATED PROCEEDINGS APPENDIX**

None.